

AD-A115 960

LETTERMAN ARMY INST OF RESEARCH PRESIDIO OF SAN FRANC--ETC F/G 6/3  
LAND LEECHES OF THE G.HAEMADIPSA (HAEMADIPSOIDEA:HAEMADIPSIDAE)--ETC(U)  
MAY 82 H R WILSON, G H EISENBERG

UNCLASSIFIED

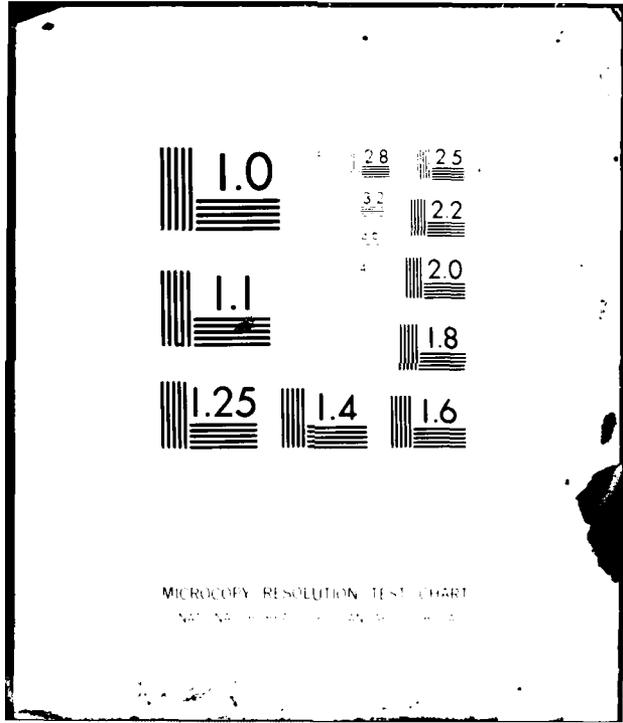
LAIR-122

NL

1 of 1  
AD-A  
UNCLASSIFIED



END  
DATE  
FORMED  
07-82  
DTIC



MICROCOPY RESOLUTION TEST CHART  
NBS 1963-A

AD A115960

(R)

INSTITUTE REPORT NO. 122

LAND LEECHES OF THE g. *Haemadipsa* (Haemadipsoidea: Haemadipsidae)  
II. A Bibliography

H. R. WILSON, PhD  
G.H.G. EISENBERG, PhD, MAJ MS  
and  
D.J. WASHINGTON, SP5

DIVISION OF CUTANEOUS HAZARDS

DTIC FILE COPY

MAY 1982

LETTERMAN ARMY INSTITUTE OF RESEARCH  
PRESIDIO OF SAN FRANCISCO, CALIFORNIA 94129

This document is approved  
for release to the public  
with the following exceptions:

Land Leeches of the g. *Haemadipsa* (Haemadipsoidea: Haemadipsidae)  
II. Bibliography --Wilson, Eisenberg, and Washington

Reproduction of this document in whole or in part is prohibited except with the permission of the Commander, Letterman Army Institute of Research, Presidio of San Francisco, California 94129. However, the Defense Technical Information Center is authorized to reproduce the document for United States Government purposes.

Destroy this report when it is no longer needed. Do not return it to the originator.

Citation of trade names in this report does not constitute an official endorsement or approval of the use of such items.

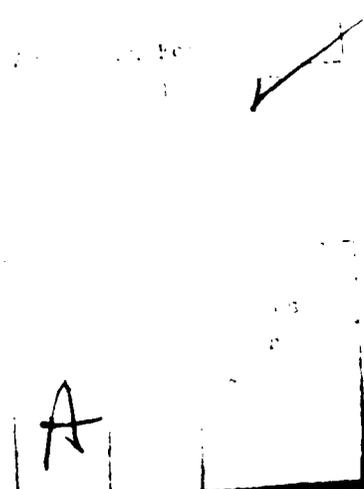
This material has been reviewed by Letterman Army Institute of Research and there is no objection to its presentation and/or publication. The opinions or assertions contained herein are the private views of the author(s) and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense. (AR 360-5)

*W. W. ...* COL MC 17 May  
.....  
(Signature and date)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER LAIR INSTITUTE REPORT NO. 122	2. GOVT ACCESSION NO. AD-A115 964	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Land Leeches of the g. <u>Haemadipsa</u> (Haemadipsoidea: Haemadipsidae) II. A Bibliography.	5. TYPE OF REPORT & PERIOD COVERED Final 1980	
	6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s) H.R. Wilson, Ph.D., G.H.G. Eisenberg, Ph.D., MAJ MS, and D.J. Washington, SP5	8. CONTRACT OR GRANT NUMBER(s)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Division of Cutaneous Hazards Letterman Army Institute of Research Presidio of San Francisco, CA 94129	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61101A 3A161101A91C 00 WU 052 APC 504R	
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Medical Research & Development Command Ft Detrick, MD 21701	12. REPORT DATE May 1982	
	13. NUMBER OF PAGES 20	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED	
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report)  This document has been approved for public release and sale: Its distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  <u>Haemadipsa</u> ; sanguivorous land leeches; blood-sucking land leeches; land leeches, bibliography.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  References to sanguivorous land leeches of the g. <u>Haemadipsa</u> are difficult to collect since they are poorly cross-referenced and are in obscure journals. We have published this bibliography to aid other investigators studying these leeches.		

ABSTRACT

References to sanguivorous land leeches of the g. *Haemadipsa* are difficult to collect since they are poorly cross-referenced and are located in obscure journals. We have published this bibliography to aid other investigators studying these leeches.



## PREFACE

The protocol to evaluate formulations as potential leech repellents (Project No: 3A161101A91C, Work Unit 052, 20 December 1979) was suspended before a laboratory colony of *Haemadipsa zeylanica* could be established. We wish to express our appreciation to LTC Michael Groves, U.S. Army Medical Research Unit, Kuala Lumpur, Malaysia, and LTC Herbert Segal, U.S. Army Medical Component, SEATO, Bangkok, Thailand, who were going to direct the field collection of *H. zeylanica* and arrange for their shipment to Letterman Army Institute of Research. The present affiliation of Dr. Wilson is: Department of Microbiology, Burroughs Wellcome Co., 3030 Cornwallis Road, Research Triangle Park, NC, 27612.

TABLE OF CONTENTS

Abstract	i
Preface	ii
Table of Contents	iii
BODY OF REPORT	
Introduction with References	1
BIBLIOGRAPHY	3
DISTRIBUTION LIST	12

Land Leeches of the g. *Haemadipsa* (Haemadipsoidea: Haemadipsidae)  
II. A Bibliography.

Sanguivorous land leeches of the g. *Haemadipsa* are well-known to people who cohabit areas of the Orient with them. Travelers find their attacks highly objectionable, if not intolerable (1-3) and their presence can adversely affect military operations (4). Nonetheless, little quantitative field or laboratory data are available for these invertebrates, and their systematic position has only recently been substantially clarified (5).

Reports and studies of the g. *Haemadipsa* are not only widely scattered in the literature and inadequately cross-referenced, they are also usually found in obscure journals which are difficult to obtain. We are publishing this bibliography to bring these references together as an aid to future studies.

References to *Haemadipsa* species which either have been, or might be, assigned to other genera (6-8) are included for historical completeness. Presently, *Haemadipsa braveri*, *H. dussumieri*, *H. fallax*, *H. limbata*, *H. morsitans*, *H. noxia*, *H. papuensis*, *H. vagans* (9), *H. pittarelli* (10), and *H. bilobata* (11) are in this category. We have also included references which do not identify the sanguivorous land leech involved but which originate from geographic areas in which *Haemadipsa* sp are commonly found.

REFERENCES

1. WHITMAN, C.O. The leeches of Japan. I. The ten-eyed leeches, or Hirudinidae. Q J Microsc Sci 26:317-416, 1886
2. MOORE, J.P. Arhynchobdellae. In: The Fauna of British India, including Ceylon and Burma. Hirudinea. Edited by W. A. Harding and J.P. Moore. London: Taylor and Francis, 1927. pp 97-298
3. KEEGAN, H. L., S. TOSHIOKA, and H. SUZUKI. Blood-sucking Asian leeches of families Hirudinidae and Haemadipsidae. Report No. 16. Biomedical Reports of the 406th Medical Laboratory, Japan: U. S. Army Medical Command, 1968
4. WILSON, H.R. and G.H.G. EISENBERG. Land Leeches of the g. *Haemadipsa* (Haemadipsoidea: Haemadipsidae) I. Conditions Essential to Laboratory Colonization. Institute Report No. Presidio of San Francisco, California: Letterman Army Institute of Research, 1982

5. RICHARDSON, L.R. A contribution to the general zoology of the land leeches (Hirudinea: Haemadipsoidea Superfam. Nov.) Acta Zool Acad Sci Hung 21:119-152, 1975
6. RICHARDSON, L.R. *Nomanibdella* gen. nov., a duognathous 5-annulate land leech genus in New Guinea (Hirudinoidea: Haemadipsidae s.l.), with a discussion on general somital annulation. Mem Natl Mus Victoria 35:97-109, 1974
7. RICHARDSON, L.R. On the zoological nature of land-leeches in the Sechelles Islands, and a consequential revision of the status of land-leeches in Madagascar (Hirudinea: Haemadipsoidea). Rev Zool Afr 92:837-866, 1978
8. SOOS, A. Identification key to the leech (Hirudinoidea) genera of the world with a catalogue of the species. IV. Family: Haemadipsidae. Acta Zool Acad Sci Hung 13:417-432, 1967
9. BLANCHARD, R. Monographie des Hemadipsines (Sangsues Terrestres). Bull Soc Pathol Exot 10:640-675, 1917
10. DEQUAL, L. Nuovi Irudinei esotici del Museo Zoologico di Torino. Boll Mus Zool Anat Comp Univ Torino 32:1-20, 1917 (cited in Soos 1967, p 431)
11. MOORE, J.P. Leeches (Hirudinea) from the Hawaiian Islands and two new species from the Pacific Region in the Bishop Collection. Occas Pap Bishop Mus Honolulu 18:171-191, 1946 (cited in Soos 1967, p 432)

## BIBLIOGRAPHY

Not all of the following references have been verified by the authors. However, due to the difficulty of finding references to the g. *Haemadipsa*, we have listed both verified and unverified references to make the bibliography as complete as possible; unverified references are identified as: "cited in . . . ." Copies of most verified references are on file in the Division of Cutaneous Hazards.

- ALLEN, A.M. Internal Medicine in Vietnam. I. Skin diseases in Vietnam 1965-1972. Washington, DC: U.S. Government Printing Office, 1977. pp 130-136
- ANONYMOUS. Letter from SWG-MR, HQ, U.S. Army Combat Developments Command, Fort Belvoir, VA, dated 25 August 1964, Subject: Draft Proposed Small Development Requirement (SDR) for Leech Repellent
- ANONYMOUS. The oriental land leech. Science (suppl) 74(1929):12-14, 1931.
- ARCHER, T.C.R. Medical problems of the operational infantry soldier in Malaya. J Roy Army Med Corps 104:1-13, 1958
- AUDY, J.R., and J.L. HARRISON. Field tests of repellent M-1960 against leeches. Med J Malaya 8:240-250, 1954
- AUDY, J.R. Leeches. Institute for Medical Research Annual Report for 1952. Federation of Malaya, 1954 p 67
- AUGENER, H. Arch Hydrobiol Suppl 8:750, 1931 (cited in Soos 1967, p 425)
- AUGENER, H. Resultats Scientifiques du Voyage aux Indes Orientales Neerlandaises de LL.AA. RR. le Prince et la Princesse Leopold de Belgique. Mem Mus Roy d'Hist Nat Belg, Hors Serie 2:1-12, 1931 (cited in Richardson 1978, p 866)
- BAILEY, F.M. China-Tibet-Assam. A Journey, 1911. London: Jonathan Cape, 1945. pp 160-164
- BAILEY, F.M. Land leeches. J Bombay Nat Hist Soc 52:652, 1954
- BARNHART, C.S. Leech repellent development and testing. U.S.A. Limited War Laboratory Technical Report TR-3, DDC Report No. 440958, 11 May 1964
- BECCARI, O. Wandering in the Great Forests of Borneo. London: A. Constable and Co. Ltd 1904 (cited in Stammers 1950, p 246)

- BHATIA, M.L. Extra ocular photoreceptors in the land leech, *Hirudinipolystephanus affinis* (Moore) from Nainital, Almora (India). *Nature* 178:420-421, 1956
- BHATIA, M.L. and S.S. BORA. Bionomics and distribution of the land leeches of the Kumaon Hills, U.P. *J Bombay Nat Hist Soc* 70:36-56, 1973
- BHATIA, M.L. Land leeches, their adaptation and response to external stimuli. *Zool Pol* 25:31-53, 1975
- BLANCHARD, R. Dictionnaire encyclopedique sci. med. art. Hirudinees. Paris, 1887 (cited in Moore 1927, p 291)
- BLANCHARD, R. Revision des Hirudinees du Musee de Dresde. *Abh Ber Zool Mus Dresden* 1892/1893 4:1, 1894 (cited in Soos 1967, p 431)
- BLANCHARD, R. Viaggio di Leonardo Fea in Birmanica e regione vicine - LVII. Hirudinees. *Ann Mus Civ Stor Nat, Genova.* 14:113-118, 1894 (cited in Moore 1929, p 294)
- BLANCHARD, R. Hirudinees du Musee de Leyde. *Not Leyden Mus* 19:73-113, 1897 (cited in Moore 1935, p 78)
- BLANCHARD, R. Hirudinees des Indes Neerlandaises. *Zool Ergeb Reise in Niederlandisch Ost-Indien.* 4:332-355, 1897 (cited in Keegan *et al.*, 1968, p 50)
- BLANCHARD, R. Monographie des Hemadipsines (Sangsues Terrestres). *Bull Soc Pathol Exot* 10:640-675, 1917
- BLYTH, R.I.K. War on leeches. *Br Med J* 2:1058, 1950
- BRANDES, G. In Leuckart. *Die Parasiten des Menschen* (Second edition) Vol. 1, pt. 2, Appendix. Leipzig 1901 (cited in Moore 1927, p 292)
- BUU-HOI, N.P. Sur l'activite repulsive de diverses substances chimiques vis-a-vis des Sangsues terrestres du Vietnam. *C R Soc Biol (Paris)* 156:277-279, 1962
- CHAMPION-JONES, R.N. Leeches. *J Bombay Nat Hist Soc* 52:650-651, 1954
- CHELLADURAI, J.E. On the denticular web of the jaw of the common leech. *Ann Mag Nat Hist* 3:621-628, 1929
- COULTER, J.L.S. The land leech in Ceylon. *J Roy Nav Med Serv* 19:105-108, 1933
- DAVY, J. An account of the interior of Ceylon. London, 1821. pp 102-105 (cited in Moore 1927, p 292)

- DeMESA, A. Forest pests man should avoid. Philipp J For 3:191-201, 1940
- DEQUAL, L. Nuovi Irudinei esotici del Museo Zoologico di Torino. Boll Mus Zool Anat Comp Univ Torino 32:1-20, 1917 (cited in Soos 1967, p 431)
- DIXIT, R.S., B.N. SAXENA and H.G. KHALSA. Evaluation of repellents against land leeches. Labdev J Sci Tech, Part B Life Sci 5:140-155, 1967
- FUKUOKA, G. Biological and physiological studies on the mountain leech form Kasugayama, Nara Prefecture (Preliminary report) [Jap]. Physiol Ecol Contr Hydrobiol Expt Sta Kyoto Univ 27:1-6, 1945 (cited in Biol Abst 25:1152, 1951)
- GIARD, A. *Haemaphysa japonica* Whitman variete sexpunctata, Giard. Arch Med Nav Colon 63:354-355, 1895 (cited in Soos 1967, p 431)
- GREEN, P. E. Boring power of land leeches. Spolia Zeylan 4:181, 1907 (cited in Moore 1927, p 292)
- HAKLUYT, R. Voyages. 2:58, 1598 (cited in Stammers 1950, p 246)
- HAEKEL, E. A visit to Ceylon. English Translation. Boston. 1883. pp 188-189 (cited in Stammers 1950, p 246)
- HARRISON, J.L., J.R. AUDY, and R. TRAUB. Further tests of repellents and poisons against leeches. Med J Malaya 9:61-71, 1954
- HARRISON, J.L. Leeches. Med J Malaya 8:180-185, 1953
- HARRISON, J.L. Sexual behavior of land leeches. J Bombay Nat Hist Soc 51:959-960, 1953
- HARRISON, J.L. Notes on land leeches. J Bombay Nat Hist Soc 52:468-472, 1954
- HARVEY, DR. Land leeches of Ceylon. Ann Mag Nat Hist 3:324, 1869 (cited in Moore 1927, p 292)
- HOOKE, J.D. Himalayan Journals. London, John Murray. 1854. i: 107, 167; ii: 17, 54 (cited in Moore 1927, p 292)
- HORNADAY, W.T. Two years in the jungle. New York, 1886. p 426 (cited in Moore 1927, p 292)

- HORST, R. Expeditie naar Midden-Sumatra. Vermes. 1884, pp 9-13  
Tijdschrift der Nederl Dierkunde Vereeniging, VI cited in Moore  
1935, p 78)
- HOSHI, T. Haemadipsa in the Philippines. [Jap]. Zool Mag (Tokyo)  
81:421-422, 1972
- KABURAKI, T. Notes on some leeches in the collection of the Indian  
Museum. Rec Indian Mus Calcutta 22:689-719, 1921
- KEEGAN, H.L., S. TOSHIOKA, and H. SUZUKI. Blood-sucking Asian leeches  
of families Hirudinidae and Haemadipsidae. Report No. 16. Biomed-  
ical Reports of the 406th Medical Laboratory, Japan: U. S. Army  
Medical Command, 1968
- KINLOCH, A.P. Leech attacking a snake. J Bombay Nat Hist Soc 28:557,  
1922
- KNOX, R. Historical relations of the Island of Ceylon. 1681. pp 48-49  
(cited in Moore 1927, p 293)
- KOSHI, T. and R.N. VARMA. A preliminary study of the land leeches of  
Assam and NEFA. Armed Forces Med J India 21:99-104, 1965
- KUKENTHAL, W. Malayischen Archipel. 1896 (cited in Moore 1929, p 293)
- LANDON, P. The opening of Tibet. New York, 1905. p 49 (cited in  
Moore 1927, p 293)
- LESLIE, C.J. Mating behaviour of leeches. J Bombay Nat Hist Soc  
50:422-423, 1951
- MANN, K.H. Leeches (Hirudinea): Their Structure, Physiology, Ecology  
and Embryology. New York: Pergamon Press, 1962
- MATTHEWS, R.S. Land leeches. J Bombay Nat Hist Soc 52:655-656, 1954
- MILLER, C.C. Black Borneo. New York: Modern Age Books, 1942.  
pp 92-95
- MJOBERG, E. Expeditions of the Sarawak Museum. Report of the Sarawak  
Museum, 1915-1923. (cited in Moore 1929, p 295)
- MOORE, J.P. The control of blood-sucking leeches with an account of the  
leeches of Palisade interstate park. Roosevelt Wild Life Bull 2:9,  
1923 (cited in Richardson, L.R. Aust Zool 14:394-305, 1968, p 305)

- MOORE, J.P. Notes on some Asiatic leeches (Hirudinea) principally from China, Kashmir, and British India. Proc Acad Nat Sci Philadelphia 76:343-388, 1924
- MOORE, J.P. Arhynchobdellae. In: The Fauna of British India, including Ceylon and Burma. Hirudinea. Edited by W. A. Harding, and J.P. Moore. London: Taylor and Francis, 1927, pp 97-298
- MOORE, J.P. Leeches from Borneo with descriptions of new species. Proc Acad Nat Sci Philadelphia 81:267-295, 1929
- MOORE, J.P. Leeches (Hirudinea) from China with descriptions of new species. Proc Acad Nat Sci Philadelphia 82:169-192, 1930
- MOORE, J.P. The life of the Darjeeling land leech. Darjeeling Nat Hist Soc Bengal 5:106-117, 1931
- MOORE, J.P. How abundant are land leeches? J Bombay Nat Hist Soc 35:701-702, 1932
- MOORE, J.P. Land leeches in the "Fauna of British India" - some corrections. Rec Indian Mus Calcutta 34:1-6, 1932
- MOORE, J.P. A description of *Aetheobdella hiruodoides*, gen. et sp. n., from New South Wales. Ann Mag Nat Hist 16:296-304, 1935
- MOORE, J.P. Leeches from Borneo and the Malay peninsula. Bull Raffles Mus Singapore 10:67-79, 1935
- MOORE, J.P. Leeches (Hirudinea) principally from the Malay peninsula, with descriptions of new species. Bull Raffles Mus Singapore 14:64-80, 1938
- MOORE, J.P. Leeches in the British Museum, mostly Haemadipsinae from the South Pacific with description of new species. Ann Mag Nat Hist 11:383-409, 1944 (cited in Soos 1967, p 432)
- MOORE, J.P. Leeches (Hirudinea) from the Hawaiian Islands and two new species from the Pacific Region in the Bishop Collection. Occas Pap Bishop Mus Honolulu 18:171-191, 1946 (cited in Soos 1967, p 432)
- MOQUIN-TANDON, A. Monographie de la famille des Hirudinees. Montpellier, 1826, p 152 (cited in Soos 1967, p 432)
- MOQUIN-TANDON, A. Monographie de la famille des Hirudinees. Paris: (Second edition) Bailliere, 1846, p 448 (cited in Richardson, F.R. Aust Zool 14:294-305, 1968, p 305)

- OKA, A. On some new Japanese land leeches. J Coll Sci Imp Univ Jpn 8:275-306, 1895
- OKA, A. Synopsis der japanischen Hirudineen, mit Diagnosen der neun Spezies. Annot Zool Jpn 7:165-183, 1910 (cited in Soos 1967, p 432)
- OKA, A. Annot Zool Jpn 10:320, 1925 (cited in Soos 1967, p 426)
- OKA, A. Sur une variete de l'*Haemadipsa zeylanica* s'attaquant aux oiseaux. Proc Imp Acad Tokyo 6:82-84, 1930 (cited in Soos 1967, p 432)
- PAJA, S. and I. VARAPORN. Field studies on the effectiveness of repellents against terrestrial leeches in Southern Thailand. Special Report. Joint Thai-U.S. Military Research and Development Center, Bangkok. DDC Technical Report No. 465564, January, 1965
- PETCH, T. Extension of the range of the common leech. Spolia Zeylan 20:79-80, 1919 (cited in Moore 1927, p 294)
- RAJAK, R.L., S.L. PERTI, and P.N. AGARWAL. Recent advances on the biology of land leeches and protection against their ravages. Labdev J Sci Technol, Part B, Life Sci 6:125-137, 1968
- RAJAK, R.L., A.P. SRIVSTAVA, and S.L. PETRI. Studies on life history and behavior of land leeches. Labdev J Sci Tech, Part B, Life Sci 6:165-168, 1968
- RAMACHANDRAN, P.K., T. KOSHY, K.G.K. SASTRY, S.P. SINGH, M.N. SRINIVASAN, and S.K. GANGULY. Studies on leech repellents. J Econ Entomol 64:1293-1294, 1971
- RIBBANDS, C.R. Experiments with leech repellents. Ann Trop Med Parasitol 40:314-318, 1946
- RICHARDSON, L.R. *Domanibdella* gen. nov., a duognathous 5-annulate land leech genus in New Guinea (Hirudinoidea: Haemadipsidae s.l.), with a discussion on general somital annulation. Mem Natl Mus Victoria 35:97-109, 1974
- RICHARDSON, L.R. A contribution to the general zoology of the land leeches (Hirudinea: Haemadipsoidea Superfam. Nov.) Acta Zool Acad Sci Hung 21:119-152, 1975
- RICHARDSON, L.R. A convenient technique for killing and preserving leeches for general study. J Parasitol 61:78, 1975

- RICHARDSON, L.R. On the zoological nature of land-leeches in the  
 Sechelles Islands, and a consequential revision of the status  
 of land leeches in Madagascar (Hirudinea: Haemadipsoides). *Rev*  
*Zool Afr* 92:837-866, 1978
- ROBERTSON, M. Studies on Ceylon Haematozoa. *Q J Micros Sci* 53:660,  
 1909 (cited in Moore 1927, p 294)
- ROY, D.N. and A.W.A. BROWN. Entomology (Medical and Veterinary),  
 including Insecticides and Insect and Rat Control (Second edition).  
 Calcutta: Excelsior Press, 1954 (cited in Saxena, Dubey, Pillai  
 and Khalsa 1969, p 29)
- SAXENA, B.N. and H.G. KHALSA. Persistence of leech repellents on cloth.  
*Armed Forces Med J India* 23:8-16, 1967
- SAXENA, B.N., D.N. DUBEY, K.R.M. PILLAI, and H.G. KHALSA. Control of  
 land leeches. *Pesticides (Bombay)* 3:27-29, 1969
- SAXENA, B.N., H.G. KHALSA, and K.R.M. PILLAI. Evaluation of repellents  
 against land leeches, Part II. *Def Sci J* 19:93-96, 1969
- SCHMARDA, L.K. Neue Turbellarien, Rotatorien und Anneliden beobachtet  
 und gesammelt auf einer Reise um die Erde 1853 bis 1857. Leipzig.  
 2te Halften. 1861, pp 2-7 (cited in Moore 1927, p 294)
- SCRIBAN, I.A., and H. AUTRUM. Hirudinea. In: *Handbuch der Zoologie*.  
 Vol II, Part 2, Sec 8, edited by W. Kukenthal and T. Krumbach.  
 Berlin: Walter de Gruyter, 1934
- SEAGRAVE, G.S. *Burma Surgeon Returns*. New York: W.W. Norton & Co.,  
 1946. pp 60-61
- SEMPER, C. *Zeitsch. f. Wiss. Zool.* 13:559, 1863 (cited in Bhatia and  
 Bora 1973, p 56)
- SHARMA, K.N. A field trial of DEET as a leech repellent. *Armed Forces*  
*Med J India* 25:260-263, 1969
- SHAW, G.E. *Leeches of the Darjeeling District*. *Darjeeling Nat Hist*  
*Soc Bengal* 3:19-22, 1929
- SHIPLEY, A.E. *The Minor Horrors of War*. London: Smith, Elder & Co.,  
 1915 (cited in Stammers 1950, p 246)
- SIBREE. *A Naturalist in Madagascar*. London, 1915 (cited in Moore  
 1927, p 294)

- SMYTHE, F.S. The Kangechenjunga Adventure. London: Victor Gollancz Ltd, 1930 (cited in Stammers 1950, p 246)
- SMYTHIES, B.E. Notes and queries on land leeches. J Bombay Nat Hist Soc 51:954-958, 1953
- SMYTHIES, B.E. Leeches of Borneo. Sarawak Mus J 9:279-294, 1959
- SONCHAI, C. 1965. Collection Data on Leeches in Thailand Special Report-Joint Thai-U.S. Research and Development Center, Bangkok, 4 Feb, 1965. (unpublished) 6 pages plus appendix of six pages (cited in Keegan *et al*, 1968, p 61)
- SONG, D., J. ZHANG, E. TAN and L. LIU. On some blood-sucking leeches from China (Chin). Acta Zool Sin 23:102-108, 1977
- SOOS, A. Identification key to the leech (Hirudinoidea) genera of the world with a catalogue of the species. IV. Family: Haemadipsidae. Acta Zool Acad Sci Hung 13:417-432, 1967
- STAMMERS, F.M.G. Observations on the behavior of land leeches (genus *Haemadipsa*). Parasitology 40:237-246, 1950
- SUZUKI, H., and Y. NOBORU. A study on animals in Okinawa, Japan. [Jap]. Jpn J Sanit Zool 24:332, 1974
- SYKES, W.R. Leeches. J Bombay Nat Hist Soc 53:148-150, 1955
- TAFT, F.H. Preliminary experiences with a long acting leech repellent. U.S. Army Pamphlet 40-7. 1968. p 56
- TENNENT, J. E. Ceylon. An Account of the Island. (2 Vols.) London: Longman and Co. (First, Second, Third Editions) 1859. (Fourth Edition) 1860. i, pp 301-307 (cited in Moore 1927, p 295)
- TENNENT, J.E. Sketches of the Natural History of Ceylon. London: Longman, Green, Longman, and Roberts, 1861. pp 479-483
- TIMMONS, R.W., C.W. CARLISLE, H.W. HEMBREE, and C.E. BLEDSOE. Final Report of Integrated Engineering/Service Test of Improved Leech Repellent. USATECOM Project No. 7-4-0480-01-09. Fort Lee, Virginia: U.S. Army General Equipment Test Activity, March 1965
- TRAUB, R., C.L. WISSEMAN, and J.R. AUDY. Preliminary observations on a repellent for terrestrial leeches. Nature 169:667-668, 1952
- TUBANGUI, M.A. Observations on the possible transmission of surra by the land leech *Haemadipsa zeylanica*. Philipp J Sci 48:115-126, 1932

- TYTLER, J. The bite of the Ceylon leech. *Edin New Philos J* 1:375-377, 1826 (cited in Moore 1927, p 295)
- VAN BENTHAM JUTTING, T. De Patjet, *Haemadipsa zeylanica*. *Tropische Natuur* 21:17-23, 1932
- VEAZIE, W.H., and R.C. OVERBECK. State-of-the-Art Study on Leech Repellents. Battelle Memorial Institute, 1963. DDC Report No. 413979, August 1963
- WALLACE, A.R. The Malay Archipelago. (Tenth edition). London: MacMillan and Co. Ltd. 1902 (cited in Tubangui 1932. p 126)
- WALTON B.C., R. TRAUB, and H.D. NEWSON. Efficacy of the clothing impregnants M-2065 and M-2066 against terrestrial leeches in North Borneo. *Am J Trop Med Hyg* 5:190-196, 1956
- WHITMAN, C.O. The leeches of Japan. I. The ten-eyed leeches, or Hirudinidae. *Q J Microsc Sci* 26:317-416, 1886
- WILLIAMS, J.L.H. Land leeches. *J Bombay Nat Hist Soc* 52:652-655, 1954
- WILSON, C.S. Repellents for leeches. Bethesda, Maryland: Naval Medical Research Institute, 27 April 1944. 3 pp
- WILSON, H.R., and G.H.G. EISENBERG. Development of a laboratory capability for evaluating test formulations as repellents for Asian terrestrial leeches. Letterman Army Institute of Research Protocol for Work Unit 052, 20 Dec 1979
- WILSON, H.R., and G.H.G. EISENBERG. Land Leeches of the g. *Haemadipsa* (Haemadipsoidea: Haemadipsidae) I. Conditions essential to laboratory colonization. Institute Report No. . Presidio of San Francisco, California: Letterman Army Institute of Research, 1982
- WORTH, C.B. Description and discussion of the biting of an Indian land leech. (Annelida: Hirudinea). *J Bombay Nat Hist Soc* 50:423-426, 1951
- WRIGHT, 1928 (cited in Moore 1929, p 284)

**OFFICIAL DISTRIBUTION LIST**

Commander  
US Army Medical Research and Development Command  
ATTN: SGRD-RMS/Mrs. Madigan  
Fort Detrick, Frederick MD 21701

Defense Technical Information Center  
ATTN: DTIC-DDA (12 copies)  
Cameron Station  
Alexandria VA 22314

Director of Defense Research and Engineering  
ATTN: Assistant Director, Environmental and  
Life Sciences  
Washington DC 20301

The Surgeon General  
ATTN: DASG-TLO  
Washington DC 20314

HQ DA (DASG-ZXA)  
WASH DC 20310

Superintendent  
Academy of Health Sciences  
ATTN: AHS-COM  
Fort Sam Houston TX 78234

Assistant Dean  
Institute and Research Support  
Uniformed Services University of Health Sciences  
6917 Arlington Road  
Bethesda MD 20014

Commander  
US Army Environmental Hygiene Agency  
Aberdeen Proving Ground MD 21070

US Army Research Office  
ATTN: Chemical and Biological Sciences Division  
P.O. Box 1221  
Research Triangle Park NC 27709  
Biological Sciences Division  
Office of Naval Research  
Arlington VA 22217

Director of Life Sciences  
USAF Office of Scientific Research (AFSC)  
Bolling AFB  
Washington DC 20332

Director  
Walter Reed Army Institute of Research  
Washington DC 20012

Commander  
US Army Medical Research Institute of Infectious  
Diseases  
Fort Detrick, Frederick MD 21701

Commander  
US Army Research Institute of Environmental  
Medicine  
Natick MA 01760

Commander  
US Army Institute of Surgical Research  
Brooke Army Medical Center  
Fort Sam Houston TX 78234

Commander  
US Army Institute of Dental Research  
Washington DC 20012

Commander  
US Army Medical Bioengineering  
Research and Development Laboratory  
Fort Detrick, Frederick MD 21701

Commander  
US Army Aeromedical Research Laboratory  
Fort Rucker AL 36362

Commander  
US Army Biomedical Laboratory  
Aberdeen Proving Ground  
Edgewood Arsenal MD 21010

Commander  
Naval Medical Research Institute  
National Naval Medical Center  
Bethesda MD 20014

Commander  
USAF School of Aerospace Medicine  
Aerospace Medical Division  
Brooks Air Force Base TX 78235